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THE NEW PATH.

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SCIENCE IN ITS RELATIONS TO ART.

THE following article, as will be seen, runs counter to the general drift of the "New Path." We welcome it, however, because, never having meant this journal to be exclusive or bigoted, we have always wished that some opponent of our very frankly expressed opinions, would take up our gauntlet. At last, this has been done, and we trust that the writer to whom we open our columns, will meet with some one who can confute his logic and upset his conclusions.

[Editor "New Path."]

THERE is some disposition manifested among artists generally, and particularly among those of the realist school, to ignore the claims of science, and to prefer to paint and study in utter ignorance and disregard of all scientific teaching. Says one class, "What have we to do with science? Is not the idea of beauty innate, and are not poetry and science opposed? Knowledge would only serve to chill our enthusiasm, to repress our longings after the ideal. We wish none of it." Say others, "We paint nature as we see it; we desire to present it to all men as they see it themselves. Nothing but observation and a trained hand are necessary for this. What good would knowledge bring us,—above all, scientific knowledge? Did we know more, we should be apt to paint things not as they are, but as in our ideas they ought to be. We should fall into a like error to that from which we have escaped. Others paint ideal beauty, we try to paint reality; with science we should paint ideal correctness." Others say, beside, "You will find that the best artists were those who were most simple and ignorant. Knowledge only adds conceit and pride. True art

d demands the most perfect simplicity. Therefore, let us go on loving and trusting our art, and becoming learned only so far as that and our daily experience teach us."

In this modern day, when all things are brought under the reign of science, and when, emphatically, knowledge is power, such thoughts and assertions seem to contradict the spirit of the age and the lessons of experience, and demand to be considered and investigated. Let us, therefore, think a little on this, and see whether science and art are really at variance, and whether beauty and law are such contrary and opposite things.

We find no such disagreement at the threshold. Science is knowledge, art is skill. Art is the means and method of applying what we know. Science is the base of theory and experience which must necessarily underlie all arts and trades. As such, Art and Science are never at strife, but co-operate and mutually assist each other. Without Art, our Science would be of no avail, and we should be slain by theory. Without Science, our Art would be empiricism, and we should be stifled by ignorance.

But Art and Science are used in narrower senses. By Art, we understand the theory and practice of the creation of the beautiful; by Science, the investigation, consideration, and knowledge of the laws, especially physical, which govern the universe and its parts. Art concerns beauty, Science law. And

it is in these senses that Art and Science are supposed to clash. Now what is there in beauty that is opposed to law. Beauty is certainly not lawlessness. It does not consist in mere irregularity. If beauty consists, as some maintain, in order or proportion or even in usefulness, what is it but a complete following out of various laws. But whatever may be the ultimate analysis of beauty, it will probably be admitted, that the beautiful is that which most thoroughly carries out all the purposes for which it was created, and which therefore is governed by law. But when everything is perfect, we do not so much perceive the beautiful, as in the tendency toward perfection, where obstacles have combined to hinder and prevent. Moral beauty is most strongly exemplified in the exercise of certain virtues, where there was great temptation not to exhibit them. Heroism is most beautiful where there was the greatest temptation to cowardice. The moral beauty of truth is more especially shown where there is great incitement to falsehood. An ideal tree, where every bud had flourished, and every limb had grown in its natural direction, uninfluenced by the storms, the changes of temperature, by insects, or by other causes, would hardly seem to us as beautiful as the real. The cold has blasted some of the buds. Unequal exposure and shade have made an unequal development of some branches; the worm has eaten some shoots; some limbs may have bent by the wind; but yet beauty is there, in the way in which the tree has yet struggled to maintain its balance, as one branch has tried to take the place of another, and one bud to sprout when the other failed; and the tree in spite of all the obstacles is still a tree, and a good tree of its own kind. If beauty is not law, law at least underlies all beauty, and the study of the law would certainly not blind our eyes to the perception of the beautiful.

But whether the principles of Art and Science be the same or different, one thing is obvious, that *Science is the base of real and of all great Art*. It is necessary not only to the creation but also to the appreciation of art-works. Art is a representation of things, either objects of sight, or objects in the mind, or feelings and emotions. These things must be represented by means of certain processes, and in these processes and methods of production is Science useful and necessary. And not only that, but for the very perception of those things to be represented is Science requisite. Art represents to us the beautiful by material means to our sight or hearing, either simply in themselves, or through them to our mind. That addressed to our other senses, through it may be pleasing and agreeable, is not called beautiful.

Let us first take notice that this is by material means. Poetry speaks to our mind by words and letters through our eyes and ears. Sculpture addresses us by means of form alone. Painting by means of form and color, and principally by color. Music by sound. The first requisite of the art-worker is that he should be able to manage his materials. The would-be poet must understand the laws and capabilities of his language. He must be able, not only to picture a scene to the eye, but his words must often speak to the ear also. The more avenues of sense that are open, the sooner his ideas reach his mind, and the desired thought or feeling is produced. Poetry may be written by an ignorant man which has the true ring, and where we dimly catch glimpses of inspiration and lofty feeling through the half-broken utterances, and amid the inharmonious and jangling sounds. But a great poet,—the greatest poet,—truly and thoroughly understands the instrument that he uses. He knows it scientifically as well as practically. The

musician is required to know the laws of harmony to produce those combinations and juxtapositions of sounds which so strongly and so vividly affect our sense and our feelings. He must also do more; he must know the science of harmony theoretically as well as empirically, and the science and laws of sound in addition. So a sculptor must know the materials which he uses, the kind of clay which best serves for moulding, the qualities of marble and of metals of which he is to make his statues. The painter must know the chemical nature of the pigments with which he colors. This is necessary in order to tell whether they will endure or soon fade, or whether they will rub off, or sink in, or whether they will mix well with other paints and form compound tints. He must know whether his varnish will dry soon, whether it will work evenly, whether it will crack, and whether it will change any of his colors. What is all this but a knowledge of Science, superficial to be sure and merely empirical with most painters, but yet the nearer it approaches to a true scientific knowledge the more power does it give to its possessor over his materials and his tools.

But, besides a knowledge of materials there is a knowledge of processes. The musician must know how to produce the sounds which his instrument will express. He must know how to arrange his sounds so as to produce a harmony and not a discord. The sculptor must know how to manage his tools in order to shape or to cut those perfect forms. The painter must know more. He must know how to use his brushes, and how to grind his colors, and also how to represent that which he sees or imagines. We all know how strange a Chinese picture looks to us from its utter want of perspective. A thorough knowledge of the science of perspective is what a landscape artist particularly needs.

But lastly, where Science is peculiarly important to the artist is in his perception. We have seen that he wants some science to bring before us what he himself sees, but he needs science more to aid him to see correctly what he wishes to represent. Whether he wishes to represent things as they are, or things as they should be,—whether he is a naturalistic or an idealistic artist, he equally needs scientific knowledge. The eye is indeed our guide, but we must remember that it is only an aid to the mind, and it depends somewhat on the character and quality of the mind whether it guides us to the truth. In other words, the eyes of an ignorant and of an educated person are very different. The same object being given and the same point of view, very different and often contrary stories will be told by the two. There are often dubious and uncertain appearances in nature which to ordinary observers are quite as apt to mean one thing as another. Very frequently it is only he who by scientific study knows what to expect there that is able to perceive what really is there. The eye may be educated by mere inspection of objects, and many persons consider that this is the best way of learning to draw, for instance, the human figure. They think that as we are only required to draw or paint the outside of the body, a habit of inspection and careful consideration of its form and contour in all positions, will teach all that is necessary. But, supposing the artist to be utterly ignorant of anatomy, would it not require a very long course of generalization, and a most extraordinarily patient and accurate mind, to discover what is really the true and normal outline? Would it not be very difficult to tell precisely what curve and what line the flexed muscles would give to the yielding flesh? After long and diligent study and observation of this sort we might be able to copy from life without being

much misled or mistaken in the form. How much longer would it take before we could represent from memory a form which we had once seen, or, more than that, represent a body in a position that we may never have chanced to see? We will allow that many of the Greek sculptors studied the human form in this way only with magnificent results. But they had constantly before them at home, in the street, and in the agora, beautiful, half-draped models, and in the gymnasium and in the baths perfect nude ones. We are destitute of such opportunities for study, and are forced to shorten if not simplify our means of education. It is necessary for us, besides getting what we can from observation, to study that science whose laws govern the formation of the figure, and to learn how and why the human shape is what it is. This science—anatomy—tells us how man is constructed, how certain motions produce certain shapes, how certain contractions or flexions of the muscles produce certain differences in the outward form. Knowing the ratio of the force of the movement to the curve expressed in the limb, we have gained what long years of patient, careful observation might possibly have taught us. Experi-

ence has shown that those sculptors that have studied anatomy produce better works, more natural, more lifelike, than those who are ignorant of this science. Accordingly, anatomy is now taught in all schools where art is taught successfully. But he who represents the human form must do so in certain positions. He requires to know, therefore, what positions it is possible for bodies to take, and he must know something of mechanics. How frequently have we seen statues, almost perfect as regarded roundness and shape of limb, and expression of features, so posed that the perpendicular line from the centre of gravity fell without the base, and thus in a position which it would be impossible for them to assume. Others are placed in attitudes possible for the moment, but which would cause the figure to fall after that moment. In the celebrated Discobolus, admired on account of the intensity of the exertion, the man must inevitably fall forward to the ground the moment the quoit leaves his hand. Such are some of the errors which a knowledge of mechanics would prevent. It should be the aim of art to be beyond all criticism of this sort.

(To be continued.)

A FEW HAMMER-STROKES.

BY A MASTER-MECHANIC.

THE American, being driven by necessity to look for easy ways of doing his work of all kinds, and taking in such machines and designs as he finds ready made or invented, hampered by no personal or patriotic interest in them as having been made by himself, his father, or even his countrymen, differs in this point from the Old Countryman at home, who is not compelled to make more kinds of machinery, and who has patterns that his father designed,—for which he takes some credit to himself, and to change which seems

to him like denying his father's ghost;—hence he bends himself to agree with the pattern in use; while the American, with an open question before him, yields easily to the influence of the characters, whether of companions, scenery or climate, that surround him, and, in common parlance, "follows the fashion"—a leader of more real merit than reputation.

Of course, the main thing required of a machine is, that it should perform its work well; and if it could perform its work any better than it